➔DOI : 10.15740/HAS/AJBS/11.1/172-175
e ISSN-0976-8343 | ■ Visit us : *www.researchjournal.co.in*
■ – AFBSAH-2016 – ASIAN JOURNAL OF BIO SCIENCE
Volume **11** | Issue 1 | April, 2016 | 172-175

RESEARCH PAPER

Biochemical and antinutritional factors of kodo millet (*Paspalum scrobiculatum* L.).

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Article Info : Received : 30.12.2015; Revised : 16.01.2016; Accepted : 13.02.2016

The present investigation was carried out at Student's Instructional Farm of N.D.U.A. and T, Kumarganj Faizabad in the *Kharif* season 2014. Eleven germplasm of kodo millet namely, K-1, K-2, K-3, K-4, K-5, K-6, K-7, K-8, K-9, K-10 and KK1 were collected and used as experimental material in the field trail. The seeds of kodo millet germplasm were sown in Randomized Block with three replications on 4th August 2014. During experimentation recommended agronomical practices were adopted to achieve good crop. After harvesting the seeds of each germplasm were collected separately and used for the analysis of various biochemical and antinutritional parameters. The seeds of each germplasm were ground into fine powder stage and stored in desiccator for further analysis. Highest protein content was reported in the germplasm K-6 (9.53%). The tryptophan content in germplasm was recorded higher in K-6 (0.87g/16gN) while methionine content was reported in K-6 (0.73g/16gN). Lysine content was found highest in K-6(3.28g/16gN).Total mineral content and crude fibre were noticed maximum in K-4(4.54%) and K-2(6.93%).The antnutritional factors such as phytic acid, total phenol and tannin content were reported less in the germplasm K-6(114.61mg/100g),K-6(63.74mg/100g) and K-6(102.22 mg/100g).On the basis of overall observations the germplasm K-6, K-10, K-3 and K-9 were found superior and utilized in further research work.

Key words : Kodo millet, Tryptophan, Methionine, Lysine, Tannin, Phytic acid

How to cite this paper : Pal, Manish, Rizvi, S.K.Z., Singh, R.P., Singh, Ramesh P. and Kewat, R.N. (2016). Biochemical and antinutritional factors of kodo millet (*Paspalum scrobiculatum* L.). *Asian J. Bio. Sci.*, **11** (1) : 172-175 [Special Issue of AFBSAH-2016].

INTRODUCTION

Kodo millet (*Paspalum scrobiculatum* L.) is an important minor millet which is highly drought resistant and believed to be originated in South-East Asia and seen in America, Australia and South Africa. In India it is cultivated in Andhra Pradesh, Maharashtra, Chhattisgarh, Karnataka, Tamil Nadu and Utter Pradesh. Among the smaller millets, productivity per unit area is highest in kodo millet .The area of kodo millet was 0.480 million ha as given in India by IJMRR (2013).

The protein content of the dehusked millets varied between 8.7 per cent (kodo millet) and 13.8 per cent (pearl millet), whereas in case of milled grains it varied from 5.8 per cent (finger millet) to 12.7 per cent (pearl millet). Milled grains contained nearly 70 per cent of total fat of whole seeds. The calcium and phosphorus content of millets varied from 2.3 mg to 162.8 mg and 105 mg to 425 mg, respectively. Milling removed nearly 50 per cent calcium and about 65 per cent of phosphorus from whole seeds. The bran fraction from small millets other than finger millet, contain 23.0- 27.0 per cent oil whereas, pearl millet bran contain 15 per cent oil. (Bisoi *et al.*,2012). Kodo millet is well known for its antinutrient constituents such as trypsin inhibitors, phytates, phenol and tannins. Phytates protects oxidative stress by chelating iron involved in Fenton's reaction, while some phenolics and tannins act as antioxidant. Reactive oxygen species play a significant role in accelerating the complication of diabetes millets and antioxidant alleviates this effect. Kodo millet is rich source of phenolics, tannins and phytates, which can acts as antioxidant. Keeping the importance of this minor millet, present investigation has been planned to study the nutritional and anti- nutritional factors.

RESEARCH METHODOLOGY

The present investigation on biochemical and antinutritional factors of kodo millet (*Paspalum scrobiculatum* L.)'' was carried out at the Students Instructional farm of N.D.U.A and T. (Kumarganj), Faizabad (U.P.) India, during *Kharif* 2014. Eleven germplasm of kodo millet namely K-1, K-2, K-3, K-4, K-5, K-6, K- 7, K-8, K-9, K-10 and KK-1 were collected from different parts of eastern Uttar Pradesh and used as experimental materials in the field trail.

The content of protein was determined by Lawry's method (1951) Tryptophan content was estimated by the method given by Spies and Chambers (1949) Lysine content was estimated by Felker *et al.* (1978). The methionine content in biological sample was analyzed by method of Horn *et al.* (1946). Total mineral content was estimated by the method as described by Hart and Fisher (1971). Phytic acid in the kodo millet was analyzed by the method of Wheeler and Ferral (1971). The tannin content in kodo millet was determined by method given by Ranganna (1986). Total phenol content was estimated by Swain and Hillis, (1959) The statistical analysis of the data obtained was carried out by the method as suggested by Gomez and Gomez (1984).

RESEARCH FINDINGS AND ANALYSIS

The protein content was observed between 7.37 to 9.53 per cent (Table 1). Significant correlation was obtained regarding protein content in germplasm of kodo millet. The protein content was recorded in the range of 8.05 to 10.46 per cent as given by Jaybhaye *et al.* (2014). The highest and lowest protein content in the germplasm might be due to genetic character of that germplasm. Veena *et al.* (2005) studied the nutritional quality of some kodo millet germplasm and observed similar range of protein. Roopshree *et al.* (2008) studied the seed protein content after harvesting of the crop and found similar range of protein. The protein content of kodo millet was greater than other major cereals as reported by Chandel *et al.* (2014). Bisoi *et al.* (2012) also found protein content 8.7 per cent in kodo millet. Padulosi *et al.* (2009) also found protein content in kodo millet between range 9.02 to 9.8 per cent.The lysine content was recorded in the range of 1.65 to 3.28 g/16gN. Similar range of lysine content was reported by Chandel *et al.* (2014). Methionine content in different germplasm of kodo millet was observed in the range of 0.39-0.73 g/16gN. Similar range of methionine content was also reported by Chen *et al.* (1994). The tryptophan content was recorded in the range of 0.57 to 0.87g/16gN. The similar range of tryptophan content was also reported by Gopalan *et al.*

Table 1: Biochemical and antinutritional factors of kodo millet

Sr.No.	Germplasms	Protein content (%)	Lysine (g/16gN)	Methionine (g/16gN)	Tryptophan (g/16 g N)	Total minerals (%)	Phytic acid content (mg/100g)	Tannin content (mg/ 100g)	Phenol content (mg/ 100g)
1.	K-1	8.36	2.00	0.62	0.68	3.66	140.53	124.10	67.52
2.	K-2	7.37	1.65	0.51	0.57	2.13	158.20	132.10	77.15
3.	K-3	9.15	3.11	0.68	0.75	3.52	136.50	120.82	64.76
4.	K-4	8.35	1.99	0.59	0.67	4.54	142.23	121.58	67.54
5.	K-5	8.09	2.70	0.55	0.58	2.23	152.20	126.20	64.08
6.	K-6	9.53	3.28	0.73	0.87	4.04	114.61	102.22	63.74
7.	K-7	8.52	2.90	0.56	0.60	3.52	148.35	124.18	70.74
8.	K-8	7.66	1.95	0.58	0.64	2.52	145.26	122.14	64.76
9.	K-9	8.77	2.24	0.65	0.74	3.03	137.50	121.61	64.52
10.	K-10	9.48	3.12	0.72	0.76	3.03	134.20	115.33	64.96
11.	KK1	7.83	1.99	0.39	0.86	2.30	150.40	125.18	70.72
S.E.±		0.32	0.38	0.01	0.01	0.29	0.06	1.61	0.94
C.D. (P=0.05)		0.93	1.14	0.03	0.02	0.86	0.17	4.74	2.77

(2002). According to WHO (1985), all the minor millets were deficient in lysine content but tryptophan is found in sufficient amount. Chandel *et al.* (2014) have indicated that among the millets, kodo millet has amino acid, tryptophan (0.21 to 0.31g/16gN). The total mineral content was recorded in the range of 2.13 to 4.54 per cent. The variation in total mineral content in the germplasm might be due to genetic character of that germplasm (Veena *et al.*,2005).The health benefits of kodo millet was observed by Roopshree *et al.*(2008) who reported total mineral content (2.02%). Bisoi *et al.* (2012) also studied several genotypes of kodo millet revealed total mineral content ranging between 3.50 to 3.59 per cent and maximum content was observed in kodo millet followed by other millets. Jaybhaye *et al.* (2014) observed processing technology for millet food products and found total mineral content between 3.00 – 3.30 per cent. The phytic acid content was recorded in the range of 114.61 to 158.20 mg/100g. All the germplasm of kodo millet were found significant regarding phytic acid content. The phytic acid content was observed significantly higher in local genotypes (74.20-115.13mg/100g) than improve variety (61.87-94.36mg/100g) as observed by Roopa *et al.* (2013). Udensi *et al.*(2007) reported decrease phytic acid content in legumes during germination and various cooking process. Lower level of phytic acid is a desirable trait. The tannin content was recorded in the range of 102.22 to 132.10 mg/100g. The Phenol content was recorded in the range of 63.76 to 77.15 mg/100g.

Conclusion :

The results obtained from the present investigation revealed that protein content was recorded maximum in K-6 followed by K-10, K-3, K-9 and K-4. The amino acids tryptophan was found maximum in K-6 followed by K-10, KK1 and K-3. Methionine content was found higher in germplasm K-6 followed by K-10, K-3, K-9, and K-4. Maximum lysine content was found in K-6, followed by K-10 and K-3. High protein and amino acid content were recorded in germplasm K-6 followed by K-10. Total minerals content was found maximum in K-4 followed by K-7, K-6 and K-10. Minimum phytic acid, total phenol and tannin content were obtained in germplasm K-6.Finally on the basis of overall observations, germplasm K-6, K-10, K-3 and K-9 were found superior and utilized in further research work.

Acknowledgment :

Authors are thankful to the Department of Biochemistry and Instructional Farm incharge N. D. University of Agriculture and Technology Kumarganj, Faizabad, India for providing facilities to perform lab work, as well as field experiments on Main Experiment Station of the University.

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